



Dissemination of BARI released potato varieties in Rangpur region of Bangladesh

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Abstract

The experiment was conducted during rabi season 2019-2020 at Rangpur and Kurigram districts under Agricultural Research Station, On Farm Research Division, Alamnagar, Rangpur to promote and disseminate newly released potato variety, BARI Alu-35, BARI Alu-36, BARI Alu-37, BARI Alu-40 and BARI Alu-41 among the potato growers of Rangpur sadar Upzilla in Rangpur and Chilmari Upazilla in Kurigram. The experiment was arranged in a randomized complete block design (RCBD) with four dispersed replications. The treatments included T₁: BARI Alu-35, T₂: BARI Alu-36, T₃: BARI Alu-37, T₄: BARI Alu-40 and T₅: BARI Alu-41. BARI Alu-41 showed excellent performance and higher yield followed by BARI Alu-40 and BARI Alu-36. Farmers were happy to observe the performance of the varieties and demanded quality seed for next year cultivation. The highest common scab infection was observed in (BARI Alu-35) (1.62%) where the lowest in BARI Alu-41. Maximum virus infected was found in BARI Alu-40 (2.29%), where the lowest infection was observed in BARI Alu-41 (1.22%).

Key words: Dissemination, high yielding potato varieties, late blight resistant variety

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Introduction

Potato (*Solanum tuberosum*) is the world's fourth most economically important food crop, after wheat, rice and maize. It is a part of the diet of half a billion consumers in the developing countries. In Bangladesh, the crop is the third most important crop in Bangladesh next to rice and wheat. In Bangladesh, the cultivation of potato was started in the late 19 centuries but still average yield is very low compared to the leading potato growing countries (Hashem, 1990). According to the Bangladesh Bureau of Statistics, potato production in Bangladesh has increased from 10.85 ton/ha in 1992 to 19.9 ton/ha in 2016, making it the 4th most important food crop in the country after rice, maize, and wheat

(BBS, 2016). In 2016, the country produced 9.47 million tons of potatoes, making Bangladesh the 7th largest potato producer in the world (BBS, 2016). Potato also contributes 55% of the total vegetable production in Bangladesh (MOA, 2009). This increase of potato production is due to its easy production in various climatic conditions (Gupto et al., 2015). In fact, potato ranks third in the world's production and consumption after wheat and rice, which rank first and second respectively (Thompson and Kelly, 1957). It grows well and is considered a staple food in at least 40 countries around the world (Islam, 1987). The increase in Bangladesh production of potato is also due to its

high yield (16,540 kg/ha in potato, 3,600 kg/ha in rice and 2,400 kg/ha in wheat) (Ahmed, 1974), and to its high nutritional value. Potato is also rich in vitamin C and B, minerals, and amino acids (leucine, tryptophan and isoleucine) (Pandey, 2007). Despite the increase in production, the yield of potatoes in Bangladesh is still lower than that in other countries. In 2006, potato yield in Bangladesh was 14.38 tons/ha compared to 35.27; 36.57; 40.05; 40.20; and 44.10 tons/ha in Denmark, Germany, Netherlands, France, and the United States of America (USA) respectively, for the same year (Hossain et al., 2010). One of the reasons causing this low yield of potato in Bangladesh is the use of low yielding varieties, the low resistance of these varieties to insects and diseases, and the lack of availability of quality seed tubers (Hossain et al., 2010). Therefore, the objective of this study was to evaluate new varieties of potato for yield and resistance to diseases and insects under the climatic conditions of Bangladesh. Although the climatic conditions of agricultural crop production in Northern region of Bangladesh are favourable, especially for potato production (Haque et al., 2019; Afrin et al., 2018; Rokonuzzaman et al., 2018).

It is grown not only for food, but also for animal feed, industrial uses and seed tuber production. Potatoes are also a good source of minerals, at least 12 essential vitamins and extremely high content of vitamin C comparable to other food crops. According to DAE, the crop occupies 4.963 lac hectare lands with the annual production of 103.04 lac metric tons during 2015-16. The major constraints of such low yields viz. lack of quality and available seed tubers, high price of seed tubers, imbalanced fertilizations, no or less use of organic manures and sometimes low market value at the time of harvesting. Both chemical and organic manures fertilizers can play a major role to improve this situation (Ferdous et al. 2020a, 2020b and 2020c).

Tuber Crop research Centre (TCRC), BARI has developed a good number of potato varieties which are supposed to be higher yielder and less susceptible to

insect pest and diseases. These newly varieties need to be evaluated for their performance under different agro-ecological zones. Therefore, an adaptive trial with BARI developed potato varieties/lines was conducted to evaluate their yield performance and know farmer's opinions about the newly released improved potato varieties in different locations of Bangladesh.

Materials and Methods

Total one thousand (1000) kg of seed tubers of BARI Alu-35, BARI Alu-36, BARI Alu-37, BARI Alu-40 and BARI Alu-41 were distributed among 8 farmers at Rangpur sadar and Kurigram under OFRD, BARI, Rangpur. Each farmer received 50 kg of quality seed tubers of each variety for cultivating 5 decimals of land which totally covered 100 decimals. Plantings started on 24 November 2019 and continued up to 5 December 2019. TCRC standard fertilizer doses were applied and standard intercultural management practices were followed in the trial plots. Orientation was given to the farmers before and during the cropping season on improved seed production techniques as well as irrigation, disease management practices etc. Farmers were also suggested to follow a routine spray schedule to control Late Blight infection. Haulms were pulled after 80 days of planting. The crop was harvested on 25 February to 6 March 2020. Finally, the yield data and diseases observation data were taken from the trial plots and farmers' fields and finally converted into tons per hectare (t ha⁻¹). A statistical method SPSS (Statistical Package for Social Science) was used to analyze the data in order to produce descriptive statistics (Ferdous et al., 2016).

Gross return (GR), total variable cost (TVC) and gross margin (GM) have been calculated using the following formula:

GR = Return of main product = Yield Price (Tk.).

TVC = All input cost except land cost and interest on operating capital.

GM = GR-TVC (Ferdous et al., 2017, 2018).

Results and Discussions

Mean tuber yield among the tested varieties were ranged from 32.60 to 36.49 t/ha. The highest tuber yield (36.49 t/ha) was obtained from BARI Alu-41 followed by BARI Alu-36, BARI Alu-40 and BARI Alu-35. The lowest yield was obtained from BARI

Alu-35 (31.86 t/ha) at Ajodhapur, FSRD site, Rangpur. In case of Char Bongram, Chilmari, Kurigram found the highest yield (37.08 t/ha) from BARI Alu-41 followed by BARI Alu-40, BARI Alu-36 and BARI Alu-35. The lowest yield was obtained from BARI Alu-37 (30.38 t/ha) at Char Bongram, Chilmari, Kurigram (Table 1).

Table 1. Yield (t/ha) of newly released potato varieties at farmer's field during 2019-20.

Location	Farmers (no)	BARI Alu-35	BARI Alu-36	BARI Alu-37	BARI Alu-40	BARI Alu-41
Ajodhapur, Rangpur	F(1)	28.00	33.99	27.89	31.87	38.78
	F(2)	31.55	29.87	31.43	37.65	32.45
	F(3)	33.00	35.00	34.56	31.49	36.98
	F(4)	37.88	39.88	33.56	34.56	37.77
	Mean	32.60	34.68	31.86	33.89	36.49
Char-Bongram, Kurigram	F(1)	34.66	29.43	28.22	33.23	37.56
	F(2)	28.61	30.98	32.45	31.45	35.77
	F(3)	33.78	34.56	29.55	36.76	36.98
	F(4)	32.57	38.45	31.32	35.44	38.01
	Mean	32.40	33.35	30.38	34.22	37.08

Table 2. Diseases incidence (%) of newly released high yielding potato varieties at farmer's field during 2019-2020.

Farmers (no)		F(1)	F(2)	F(3)	F(4)	Mean
BARI Alu-35	Common scab	2.5	2	1	1	1.62
	Virus	1.5	1	1.66	2	1.54
	Late blight	20	25	15	25	21.25
BARI Alu-36	Common scab	0	0	1	1	0.5
	Virus	1	1.5	1.66	3	1.79
	Late blight	30	25	15	22	23.00
BARI Alu-37	Common scab	1.33	2.5	1	1	1.45
	Virus	2	1.5	3	1	1.875
	Late blight	15	20	25	15	18.75
BARI Alu-40	Common scab	0	0.5	1	1	0.62
	Virus	2	1.66	3	2.5	2.29
	Late blight	20	15	20	10	16.25
BARI Alu-41	Common scab	0	0	0	1	0.25
	Virus	1	1.6	1	1.3	1.22
	Late blight	10	15	20	10	13.75

The highest common scab infection was observed in (BARI Alu-35) (1.62%) where the lowest in BARI Alu-41. Maximum virus infected was found in BARI Alu-40 (2.29%), where the lowest infection was observed in BARI Alu-41 (1.22%).

The highest late blight infection was observed in BARI Alu-36 (23.00%). All the tested varieties showed moderate to severe susceptibility to Late Blight diseases. The lowest foliage infection was recorded in BARI Alu-41 (13.75%). In case of disease infection among the varieties BARI Alu-41 perform better compare to BARI Alu-35, BARI Alu-36, BARI Alu-37 and BARI Alu-40 (Table 2).

Conclusion

It may be concluded from the study that BARI Alu-41 performed better at both the locations. So BARI Alu-41 is suitable for northern region of Bangladesh compare to other varieties.

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